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Capturing a Fugitive

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The word “fugitive” has a negative connotation, particularly in the industrial world, where there is nothing good about a fugitive product, especially a dust. There needs to be a way to round up these fugitives. Fugitive dust collection is a noble cause for many reasons: industrial hygiene, safety, reducing equipment maintenance, environmental stewardship, and worker morale. No worker (nor machine) benefits from working in a dirty and unsafe environment.

The answer may lie in the understanding of “dust collection.” We should start with a traditional definition: Dust collection is the collection of airborne (fugitive) dust. The flip side is “industrial vacuum cleaning” which collects settled (fugitive) dust from a surface. Both processes are considered “dust collection.” It is routine for them to be confused and misapplied. If a factory process cannot be enclosed to prevent fugitive dust from escaping, then a two-stage solution is needed: ambient air cleaning (high airflow/low vacuum) combined with industrial vacuum cleaning (low airflow/high vacuum). One of those technologies by itself cannot solve an airborne dust condition, yet that myth continues.

As long as dust is airborne, it is potentially respirable. If a dust collector does not capture 100% of the airborne dust, the dust will eventually land on a surface such as an aisle or roadway in a plant. From there it will be tracked into control rooms or be sent airborne again by forklifts or foot traffic. It can settle on roof structural members and fall like rain if the structure is shaken. One of the worst offenders and generators of fugitive dust is compressed air blowoff. Now that it is one of the prohibited practices, along with sweeping and shoveling, under the OSHA standards for combustible dust, silica and beryllium, we stand a good chance of finally bringing our fugitive dusts to justice.

We need to acknowledge that some manufacturing processes are difficult, if not impossible, to completely enclose and prevent fugitive dust. Our equipment is also aging and lack of maintenance allows dust to leak. On a recent visit to a foundry, a pressure conveying system developed a pipeline leak while loading sand silos—almost immediately it was hard to see across the top mezzanine level. If a manufacturing process cannot be changed to correct the non-compliance, OSHA prescribes the use of engineering controls. This is where dust collectors and industrial vacuum cleaners can come to the rescue. Some manufacturers are now designing dust enclosures (i.e. engineering controls) into their equipment to prevent the escape of fugitive dust. The selection of the dust capture equipment is critical. If the dust-capture connection on the process machine is 3-in. OD or smaller, then industrial vacuum systems are the right tool for the job because the pressure drop is higher in these smaller line sizes. If the dust collection port is 4 in. or larger, then dust collection is the right choice—maybe. Some machines have a larger dust collection port, but the interior ductwork is significantly smaller. For example, a tablet press machine might have a 3- or 4-in. port on the outside, but there are multiple 1.25- or 1.5-in. OD interior tubes and the resulting pressure drop can only be overcome with an industrial vacuum system.

Other machinery such as cut-off saws and grinders that are fitted with shrouds, or process machinery like bag dump stations, are best handled with a classic high-airflow dust collector. For energy comparison, a dust collector for a 4-in. line might be fitted with a 2-3-hp fan, whereas an industrial vacuum cleaner will need 10-15 hp to generate the same airflow. Conversely, a 4-in. line with multiple smaller interior tubes will only be successful with an industrial vacuum cleaner due to the need for high vacuum measured inches of mercury (in Hg) instead of inches of water lift (in H₂O).

If dust can be captured at the point of generation, it will always take less energy than if it is allowed to disperse into the air. This is the “ounce-of-prevention is worth a pound of cure” argument. Other fugitive dust generators are devices like belt conveyors and manual scooping or dumping of raw materials into a process. If you can replace an exposed powder-handling process with a vacuum conveyor system, you will reduce the fugitive dust generation and improve the quality of your process at the same time.

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Capturing a Fugitive | Powder/Bulk Solids

Aristotle is said to have coined the phrase, "Nature abhors a vacuum." Apparently, he didn't have a fugitive dust problem.

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